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ON TRACHEOTOMY IN CROUP

By GEORGE BUCHANAN,

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[illegible] before the Surgical Section at the Annual Me[illegible]
[illegible] in Edinburgh, August 1875.

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ON TRACHEOTOMY IN CROUP AND DIPHTHERIA.*

By GEORGE BUCHANAN, M.A., M.D.,

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THE prevalence and fatality of diphtheria of late years, as may be seen by a perusal of the Registrar-General's returns, has drawn the attention of the profession to the etiology of that disease, and has recently given rise to a controversy as to the identity or non-identity of croup and diphtheria. Many able papers have appeared in the pages of the BRITISH MEDICAL and other journals on this subject, and to them I refer those interested in the question; but there is one point of resemblance which is of the utmost importance in a practical point of view. Although the two diseases may be as distinct as to cause, course, and sequelæ, as scarlet fever is from simple tonsillitis, yet both are characterised by the effusion, on the mucous membrane of the air-passages, of a tough false membrane. This membrane may differ in its nature and in situation, at least at the commencement, but the tendency in both cases is to obstruct the breathing and cause suffocation.

This seems so self-evident that I must almost apologise for mentioning it; but I have been so often met with the objection that, because the primary disease causing the effusion is diphtheria and not croup, therefore it is hopeless to interfere, as the operation will not cure the specific disease—that I have considered it not out of place to introduce it. We might as well refuse to open an abscess of the tonsil which was about to choke a patient suffering from scarlatina, because the operation will not cure the fever, as refuse to relieve a patient from instant death from suffocation because the operation is not a cure for diphtheria.

Now, the point I wish to bring out is, that there is a stage both in croup and in diphtheria at which it becomes evident that recovery is hopeless and death from suffocation certain. It is quite true that it is exceedingly difficult to say when that stage has arrived, and mistakes may sometimes occur; but I believe practically it is better to err on the safe side, and acknowledge the inefficacy of treatment, rather than delay till it is too late to resort to the last resource. Tracheotomy *per se*, though a difficult, is not a dangerous, operation; and I, for one, would be inclined to urge its performance before the strength of the little sufferer has been brought to the lowest ebb by the struggles which result from the approaching suffocation.

I wish, however, clearly to guard myself from being supposed to advocate tracheotomy in all circumstances of approaching death from croup or diphtheria. I have elsewhere explained my views on this subject, but I cannot avoid referring to them again.

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* Read before the Surgical Section at the Annual Meeting of the British Medical Association in Edinburgh, August 1875.

The diseases in question, but especially diphtheria, when they prove fatal, cause death in one of two ways : either by exhaustion or by suffocation. Hence, we may say there are two varieties, viz., the asthenic and the sthenic. In the great majority of instances, croup is a sthenic inflammation attended with effusion of lymph in the trachea, and proves fatal by suffocation. In some cases, however, the attack is attended with such a depression of the vital powers that the patient sinks apparently from the virulence of the disease. This, however, is a rare case. But in diphtheria there are two well marked types : the sthenic, which closely resembles an attack of sthenic croup, except that the effusion of lymph begins on the fauces and extends through the glottis into the trachea ; and the asthenic, which more closely resembles malignant scarlet fever, and in which the effusion covers the whole of the mucous membrane of the fauces, tonsils, and even the pharynx, and in which the false membrane soon becomes foul, putrid, ichorous, and contagious.

In the former of these types, the danger is suffocation ; in the latter, it is vital depression, death from asthenia.

Now, with regard to the treatment of these affections at the early stage, I wish here to make no reference ; the scope of my remarks is the duty of the medical attendant, when medical treatment has failed, or is clearly failing, to arrest the disease. And I think that it is very important that medical practitioners, especially those commencing practice, should be supported by the opinion of those qualified to advise them in such a delicate matter as this, seeing it is a most painful and disagreeable task to advise parents to submit their children to such a repulsive proceeding.

I believe, then, that I am justified in calling on all those who have seen much of these diseases to unite with me in asserting that, when medical treatment has been fairly tried and when it is proving unavailing, and when death seems imminent from suffocation, not from vital depression or exhaustion, it is the duty of the medical attendant to perform, or advise the performance of, tracheotomy.

I know that here I shall be met with the objection that some cases which seemed hopeless have ultimately recovered ; but these isolated examples are very few in number, and are counterbalanced out of all proportion by others in which delay, owing to repugnance to the operation and a hope that symptoms will improve, has deprived the patient of that chance of life which the surgeon can offer.

In pressing this view on my medical brethren, I am aware that I am adding nothing new to what has been frequently advanced by those who have had occasion to operate much in croup and diphtheria, but every year convinces me that it is the duty of those whose experience qualifies them to speak with authority on the matter, to reiterate their convictions, even if it be in nearly identical terms.

Last December, I was called to a case of croup, and when I arrived I found the child, a girl seven years of age, in the last stage of suffocation. The two medical gentlemen in attendance declared that the patient was beyond the reach of surgery. One of them, who had never seen the operation, strongly dissuaded me from making the attempt ; the other, who had at one time been one of my clinical students, on hearing my wish to give the child a chance, persuaded the parents to consent. The little patient was livid, and though I did not use chloroform, as I usually do, it did not wince when I made the incision through the skin. The result was that the child is now alive, and in the enjoyment of excellent health.

To one who sees the operation for the first time, the hopelessness as to the attempt is only equalled by the surprise and gratification at the result.

But, while I am so strongly advocating the operation in the circumstances referred to, there is one condition in the suffocative form of those diseases which contraindicates tracheotomy, and which, if discovered, should prevent anyone from performing it. When the suffocation depends not only on obstruction of the trachea, but also on effusion of false membrane or the glutinous fluid which precedes it, into the smaller bronchial tubes, then the case is not one for operation. The difficulty, then, is to discover when the false membrane which causes the obstruction to breathing is limited to the trachea and larynx, and when it has invaded the bronchia. Percussion and auscultation ought to assist in the diagnosis, but the restless tossing of the child and the noise of the breathing always make this a difficult proceeding.

There are two signs which appear to me to be valuable guides : one is the amount and loudness of the stridor, which is always great in proportion to the patency of the small tubes and obstruction in the trachea.

But the most valuable test is a view of the naked chest. When the obstruction is in the trachea, while the bronchial tubes are free, the respiratory movements are continued with exaggerated energy, but the chest will not respond to the muscular efforts. The result is that at each inspiration the flexible parts of the thoracic walls are drawn in with great force, the intercostal spaces are hollowed, and the ensiform cartilage sucked back. But when the small bronchial tubes, and, perhaps, the air-cells, are stopped with the viscid or membranous effusion, the muscular efforts are more feeble and the chest remains puffed out, and the whole aspect is that of a child thirsting for breath, but with the lungs already full and themselves unfit for respiration. In this latter case, I never operate ; in the former, with every hope of success.

This is not the place to enter into details with regard to the operation, which vary in many respects in different cases ; but one thing may be impressed on the young operator by one who has had considerable experience ; and that is, that tracheotomy is not the simple plunge of a knife into the trachea that many suppose, and that can be easily effected in the bloodless neck of a subject on a dissecting-room table. It requires coolness and patience on the part of the operator. Sometimes the trachea can be exposed by very little dissection ; at others, numerous obstacles come in the way, especially in young children. Among these may be mentioned overabundant cellular tissue and fat, turgid veins, isthmus of the thyroid gland, which is very large in infancy, and protrusion into the wound from below of the thymus gland, a frequent cause of surprise and annoyance to those who are not forewarned. In consequence of these possible complications, the operation must be done slowly and systematically, obstacles turned and held aside, bleeding vessels secured ; and the golden rule is that the trachea is never to be opened till its white rings are seen clearly at the bottom of the wound.

The following table contains an account of my operations of tracheotomy in croup and diphtheria, and the respective results.

CASE I. Croup ; aged 6. Cured.
II. Croup ; aged 3½. Death in three hours.
III. Croup ; aged 3. Death immediately.
IV. Croup ; aged 1¼. Death in sixteen hours.
V. Diphtheria ; aged 2. Death immediately.

vi. Diphtheria ; aged 2½. Death in six hours.
vii. Croup ; aged 1½. Death in eight hours.
viii. Croup ; aged 3. Death in twenty-four hours.
ix. Diphtheria ; aged 4. Cured.
x. Diphtheria ; aged 2½. Cured.
xi. Diphtheria ; aged 1¾. Death in twenty-four hours.
xii. Croup ; aged 5. Cured.
xiii. Diphtheria ; aged 2½. Death in forty hours.
xiv. Croup ; aged 5. Cured.
xv. Diphtheria ; aged 5. Death in twenty-eight hours.
xvi. Diphtheria ; aged 5½. Death in five days.
xvii. Diphtheria ; aged 6. Cured.
xviii. Diphtheria ; aged 3. Death in four days.
xix. Diphtheria ; aged 3½. Death in seven days.
xx. Diphtheria ; aged 2. Death in five days.
xxi. Diphtheria ; aged 2½. Cured.
xxii. Diphtheria ; aged 6. Death in two days.
xxiii. Diphtheria ; aged 5. Cured.
xxiv. Diphtheria ; aged 8. Death in thirteen days.
xxv. Croup ; aged 1½. Death in six hours.
xxvi. Croup ; aged 5. Cured.
xxvii. Diphtheria ; aged 5. Death in five days.
xxviii. Diphtheria ; aged 7. Cured.
xxix. Croup ; aged 5. Death in three days.
xxx. Diphtheria ; aged 5. Cured.
xxxi. Diphtheria ; aged 2. Death in two days.
xxxii. Croup ; aged 2½. Death in two days.
xxxiii. Diphtheria ; aged 5. Death in six days.
xxxiv. Croup ; aged 9. Cured.
xxxv. Croup ; aged 4. Death in three days.
xxxvi. Diphtheria ; aged 8. Death in eight days.
xxxvii. Diphtheria ; aged 7. Cured.
xxxviii. Diphtheria ; aged 7. Death in three days.
xxxix. Diphtheria ; aged 5. Cured.
xl. Diphtheria ; aged 5. Death in two days.
xli. Diphtheria ; aged 4. Death in three days.
xlii. Diphtheria ; aged 6. Cured.
xliii. Diphtheria ; aged 4. Death in two days.
xliv. Croup ; aged 7. Cured.
xlv. Croup ; aged 9. Death in four days.
xlvi. Diphtheria ; aged 6. Cured.
Total cases of Tracheotomy, 46. Cured 17 ; Died 29.
Tracheotomy in Croup, 16. Cured 6 ; Died 10.
,, Diphtheria, 30. Cured 11 ; Died 19.

The average result is precisely the same, viz., one child was saved out of every two and two-thirds operated on ; and, as the operation was always done when there seemed no hope of recovery otherwise, it may safely be stated that the lives of these seventeen children were saved by tracheotomy.

The following are short notes of two additional cases of Tracheotomy, at which I had the opportunity of assisting Dr Buchanan.

(1). Grierson. aet 8. Bishop. Street. Glasgow. 17th November 1880. — On going to the house we found the patient, a boy, suffering from Croup, and almost in Articulo mortis. He was labouring for breath, the breathing itself was noisy and accompanied by a crowing sound at every inspiration, and the Sterno mastoid muscles stood out like small cords at every breath. The eyes were staring, and patient was only half conscious. He was taken into the Kitchen & laid on the table — Dr B. at his head. No Chloroform was given. There was little or no bleeding, and the trachea was easily got into. From the moment the wind pipe was opened the patient began to improve. After the preliminary spluttering the breathing became quiet slow & regular. In 24 hours membrane was coughed through the tube, and the patient very rapidly regained his former health and vigour.

(2) The next case is that of a man who was admitted to the Western Infirmary Glasgow, while I was Dr Buchanan's House Surgeon, on the 19th May 1880.

Daniel Maclaren. 30. Iron Turner, admitted 19th May 1880, suffering from great difficulty of Breathing of a week's duration, which was rapidly becoming worse. The inspiration was accompanied by much crowing noise, and the difficulty of drawing the breath was so extreme that patient could not lie down, and the great drops of sweat stood on his brow from his exertions. He had been a medical patient in ward 17 (see Journal of that ward March/79 to February/80, p. 320). Dr Buchanan saw patient on evening of admission, but as he was inclined to think the violence of the symptoms ~~were~~ was partly nervous, he preferred to wait till morning, giving his House Surgeon full power to operate during the night if found absolutely necessary. Morphia & Hyoscyamus were given.

20th May. Patient had a very bad night, & Respiration, if anything, has become worse. Dr Buchanan accordingly determined to perform Tracheotomy. The patient was taken into the Theatre, and Chloroform was administered. Dr Patterson assisted. The operation in this case was one of very great difficulty and danger for these three reasons. (1) the great turgidity of the thyroid veins and con=sequent excessive hæmorrhage (2) the great masses of enlarged gland tissue that were lying in front of the trachea, (3) the trachea being slightly dis=placed to the left side after considerable difficulty the trachea was opened and the tube introduced, with instant and great relief to the patient.

21st May 1880. Since the operation this patient has enjoyed the greatest tranquility, and his general state is very good.

24th " May. This patient is still doing very well, and is now removed from the side Room into the General ward.

27th " May. General state very good, but neck much excoriated with discharges from the wound. The tube came out of trachea to day, but was with some difficulty replaced.

13th " July. Patient had walked about the ward for about 5 or 6 weeks when it was removed as he was able to breathe quite well through his Larynx. The wound healed up very rapidly & he is dismissed to day well.

Patient cam back a month afterwards quite well.